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ABSTRACT

This paper, on the health hazards of cold weather for elderly persons, presents information from various sources on the death rates in winter throughout the United States. After reviewing the scope of the problem, specific health hazards associated with cold weather are discussed, i.e., hypothermia, fires, carbon monoxide poisoning, and influenza and pneumonia. An analysis of federal and nonfederal efforts to reduce excess mortality associated with cold weather is given. Following a brief summary of the findings, suggestions for reform are offered (e.g., better monitoring by safety and consumer agencies, a National Weather Service early warning system for cold weather, governmental energy response programs, and better immunization programs). The appendices include a cold weather guide for the elderly; 12 tables of statistics on national mortality due to cold weather, fire, influenza and pneumonia between 1962 and 1980, and home heating costs in 1983; city temperatures and deaths chart by age; and service disconnection and reconnection policies by state. (BL)

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[COMMITTEE PRINT]

DEADLY COLD: HEALTH HAZARDS DUE TO COLD WEATHER

AN INFORMATION PAPER

BY THE

SUBCOMMITTEE ON HEALTH AND LONG-TERM CARE

OF THE

SELECT COMMTTEE ON AGING
HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

SECOND SESSION

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PREFACE

Cold weather is the most important environmental health hazard for the elderly — outranking air pollution and hazardous exposures. Yet, there is little evidence of an organized public health response even though it appears that many of the problems related to cold temperatures may be remedial.

This subject is important, the Subcommittee found, because there is an excess in deaths during the winter months. These health hazards are particularly life threatening for the elderly because they are "silent killers."

Take the case of Howard Spears. Spears, a 93-year-old blind man from St. Louis, Missouri, whose gas was shut off for non-payment of bills. He was found close to death last month in his apartment in which the floors and walls were covered with ice. He died several hours after his arrival at a local hospital. He died of **HYPOTHERMIA**, subnormal body temperature due to exposure to the cold.

Those seniors with a little more money might invest in a space heater to protect themselves against the threats of cold weather. Eighty-three-year-old Ida Blackwood, of Cleveland, Alabama, at the urging of concerned neighbors, had her antiquated space heater inspected by her local gas company. It was discovered that the space heater was leaking lethal levels of **CARBON MONOXIDE** — a colorless, odorless fume — a silent and invisible killer. Mrs. Blackwood was lucky. Her faulty space heater was discovered and her life was saved. Most senior citizens are not that lucky.

Winter deaths due to **FIRE** are greatest among those over the age of 65. About one-third of all fire victims are elderly who are living in their own homes or in publically financed dwellings which are badly in need of repair. In December, six died in a fire in Detroit that raced through a 40-unit apartment complex for the elderly and handicapped.

INFLUENZA, PNEUMONIA, and other infectious diseases claim numerous older lives during winter months. A

George Washington University geriatrician, Dr. Greg Paulsen, told Subcommittee staff, "you'd be amazed by the number of senior citizens I see who due to inadequate and unreliable transportation fail to find the food or medical assistance they need to remain healthy during the winter months. Imprisoned in their own homes, without nutritious meals or medicine, resistance is lowered and elderly are perfect candidates for pneumonia, flu, and other such infectious diseases."

The combination of these factors leads to excess and unnecessary winter deaths. This fact has been noted for generations in the United States. Even so, there is no evidence of any improvement or reduction in the excess of winter deaths in the United States at least between 1964 and 1980. If anything there is a widening of the differential mortality between winter and summer deaths.

This paper concludes that: 1) there is a very substantial public health problem due to cold weather; 2) that it is the greatest environmental health problem of the elderly; and 3) that a more vigorous and coordinated public health effort is needed to curb this increasing problem. With every day that we delay, more senior citizens will find themselves victimized with little or no recourse.

Finally, we would like to commend the individuals who assisted with this paper. Dr. Lewis Kuller, a Robert Wood Johnson Fellow on assignment to the Subcommittee as a Congressional Fellow, was primarily responsible for preparing, analyzing and summarizing the data contained in this paper. He was assisted in this effort by W. Moulton Avery, Director, Center for Environmental Physiology, Washington, D.C. Also, without the direction and editing assistance of Kathleen Gardner Cravedi, Bill Halamandaris, and Melanie Modlin of the majority Subcommittee staff; and Mark Benedict and Susan Roland of the minority Subcommittee staff, this report would not have been possible. Subcommittee interns Laurel Hixon and Frances Hill, and detailee Mary-Lou Stone, deserve special mention for the research assistance they provided the Subcommittee during their work on this important national topic.

We hope that this paper and our action will lead to needed reform and a reduction in death due to this preventable problem.

CLAUDE PEPPER
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INTRODUCTION

Cold weather and the hazard it presents to the health, safety, and welfare of every American, especially the elderly, is a national problem.

It is a national disgrace that thousands "freeze to death," or die as a result of "cold weather," and that so little is done to prevent their demise or further our understanding of this problem.

In cold weather, older adults are the most vulnerable of our population. Over 60,000 older Americans are stricken each year during the winter months and die quietly in their own homes, in emergency rooms, and even while shoveling their own sidewalks -- the victims of neglect, inflation, rising fuel costs which they are unable to turn around.

Unfortunately the death toll due to cold weather is increasing each year. For this reason, Chairman Claude Pepper and Ranking Minority Member Ralph Regula asked the Subcommittee staff to begin to examine the problem. Preliminary inquiries confirmed earlier suspicions.

What follows is the first comprehensive examination of the topic of cold weather and its impact on older Americans. It explores a very hidden, little explored problem which has tremendous and far-reaching implications for the elderly and all who one day will be old.

Section I of this paper attempts to measure the dimension of the problems associated with cold weather in the United States, concluding that over 60,000 lives are lost annually; that cold weather deaths are increasing annually; that the excess in deaths in winter months is increasing; that most deaths are attributed to cardiovascular failure in individuals over the age of 65; that the steady increase in deaths has been noted for generations in the United States; and that although preventive steps can be taken to reduce or curb excess winter deaths -- no concerted federal or non-federal action has been taken.

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Section II describes the most common types of health hazards associated with cold weather, including hypothermia, fires, carbon monoxide poisoning, influenza, pneumonia and other infectious diseases.

Section III explores the federal and non-federal interest in this area, and Section IV summarizes the paper's primary conclusion that the increasing incidence of deaths due to cold weather exists in dimensions few would have imagined possible; that the means of prevention exist; and, that no coordinated effort at either the public or private level exists to curb the increase in this deadly phenomenon.

Lastly, Section V provides the Congress and the States with a number of suggestions for reform which might be adopted to deal with this pervasive problem.

It is hoped that this paper and the information it contains will lead not only to further discussion but to a brightened awareness on the part of the media and the public to a problem which has too long been ignored. It is hope that reform will follow and that lives will be saved.

SCOPE OF THE PROBLEM

The winter of 1981-2 left people of virtually every State reeling from one of the harshest cold spells in memory, stunned by unrelenting snowfall, high winds, and much human tragedy. Indeed, the weather and its calamitous consequences made banner headlines.

Saddest of the stories were those of elderly people living alone in their own houses, slowly giving themselves up to a threat they could not see and knew little about: the threat of hypothermia. There were people, like an elderly couple in New York, both of whom were deaf and mute from birth. He was 90; she was 86. They could not tell anyone that their apartment was too cold. There were those like Anna Dolan, age 84, of Washington, D.C., who perished from hypothermia in temperatures many would consider livable.

These stories and others like them led the Subcommittee to convene a hearing on February 3, 1982, entitled, "The Preventable Tragedy of Hypothermia." A report released by the Subcommittee on that day revealed that hypothermic conditions may affect all persons, yet, it is the elderly who are particularly susceptible. The National Institute on Aging estimated that more than 2.5 million older Americans are vulnerable to the hypothermia threat. Particularly at risk among the elderly are those with illnesses, or those using alcohol or certain types of prescription drugs (such as antidepressants, sedatives, and tranquilizers). Hunger and fatigue can also increase the risk of hypothermia. Hypothermia means low body temperature caused by exposure to cold. For medical purposes any temperature below 95°F is considered hypothermia.

The 1982 Subcommittee report provided a description of the causes of hypothermia, the signs and symptoms and potential methods of treatment. The report concluded that the lack of public and professional education about the risk of cold weather exposure coupled with the absence of the means (low reading thermometers) for properly diagnosing hypothermia, made it difficult to reduce excess deaths associated with this cold weather hazard. As a result of Subcommittee interest with reducing unnecessary deaths due to hypothermia, various administrative and legislative

activities were undertaken which are discussed in greater detail in Appendix I of this paper, which is entitled "Hypothermia: A Preventable Tragedy: A Cold Weather Guide for the Elderly."

In November of 1983, with predictions of another harsh cold spell facing the Nation, the Subcommittee sought to identify those health hazards likely to confront older Americans during cold weather. The Subcommittee consulted numerous public and private agencies with an interest in cold weather effects, including but not limited to the National Center for Health Statistics, the Center for Disease Control, the Environmental Protection Agency, the National Heart, Lung, and Blood Institute, the National Institute of Aging, the National Oceanic and Atmospheric Administration, the Administration on Aging, the U.S. Office of Consumer Affairs, the American Gas Association, the American Association of Retired Persons, the Center for Environmental Physiology, the Washington Area Agency on Heat and Cold Stress, the National Association of Regulatory Utility Commissioners, the D.C. Office on Aging, the Potomac Electric and Power Company, Washington Gas Light Company, and the International Hypothermia Association, among others.

The Subcommittee found that:

- The problem of hypothermia specifically due to cold weather, although important and in need of effective action, was but one of a number of health hazards brought on by cold weather.
- Thousands of lives are lost during cold weather. According to the National Center for Health Statistics, approximately 60,000 lives are lost annually by problems associated with cold weather, including fires, carbon monoxide poisoning, pneumonia, influenza, and other infectious diseases, and, of course, hypothermia;

- More lives, especially elderly lives, were lost this winter than last winter. There was a substantial increase in deaths, especially for those over the age of 65, associated with the intense cold wave during the later part of December 1983. The Center for

Disease Control monitors weekly reported deaths in 121 cities in the United States. For the last 2 weeks of December and first week of January 1982-3, there were 17,876 deaths among individuals 65+. During the same time period in 1983-4, 19,205 deaths, an excess of 1,329, were reported in those areas primarily affected by the cold wave. This approximately 7% excess, if related to the total U.S. deaths age 65+, would indicate over 2,000 more deaths during the cold wave of 1983-4 as compared to 1982-3. (See Appendix II, Table 1);

- There are many more deaths in the United States during the winter months than in the spring and summer. For example, in 1978 (Appendix II, Table 2) there were 690,000 deaths from December - March and 614,000 from May through August, an excess of 76,000 or 11%. Only epidemics of flu or pneumonia are associated with similar excesses in mortality, especially among older individuals;

- The excess in winter deaths has been noted for generations in the United States (Appendix II, Table 3);

- There is no evidence of any improvement or reduction in the excess of winter deaths in the United States, at least between 1964 and 1980 (Appendix II, Table 3);

- There is a widening of the differential mortality between winter and summer deaths (Appendix II, Table 3);

- The excess deaths occur in many cities even in the temperate areas of the United States. The excess, in fact, appears to be worse in those areas in which there are irregular cold spells in a relatively temperate environment and the heating systems and insulation of homes, as well as the individual response, is inadequate. Only the extreme south and southwestern parts of the United States are usually spared (Appendix II, Table 4);

- A study by the National Environmental Research Laboratory of the Environmental Protection Agency (EPA) measured the death rates in twenty cities in the United States in relationship to temperature between 1962 and 1966. In most cities, the lowest number of deaths were at temperatures around 65-70° (Appendix II,Table 5);

  The study also examined two cold waves in the United States. During the January 25 to February 3 cold wave and excess deaths were in Florida, Texas, Georgia and Mississippi (Appendix II, Table 6);

  A second cold wave analyzed from January 6-15, 1973, resulted in a possible 950 excess deaths. In this cold wave the south was partially spared and there were little or no excess deaths in southern states (Appendix II, Table 7);

- According to a National Heart, Lung and Blood Institute study, on excess deaths due to cold, it was found that there was a substantial excess of cardiovascular deaths during cold weather. There was an increase in the number of cardiovascular deaths up to temperatures of 45 or 50°F in many major cities in the United States. The combination of snowfall and temperature increased the number of cardiovascular deaths. The effects were noted both for those over and under age 65, but the magnitude of the effect was greater in the 65+ group (Appendix III);

- We can expect that this year's cold wave will be associated with a substantial increase in the number of deaths;

- British investigators have noted that there is a substantial increase in the number of hospitalizations for heart attacks during the winter and periods of low temperature. The increase in heart attack death was not primarily related to secondary influenza and pneumonia;

- The reason for the excess mortality in cold weather and the best approaches to reducing these deaths, have not been adequately addressed. The major cause of death is probably cardiovascular disease. Most of the deaths occurred in individuals over the age of 65. Cold temperature affects the cardiovascular and pulmonary function and could result in excess risk of heart attack and deaths.

The following section is an effort to catalog most common effects of cold weather identified by the Subcommittee.

A PANOPLY OF COLD WEATHER HEALTH HAZARDS

Approximately 60,000 lives are lost annually by problems associated with cold weather, including fires, carbon monoxide poisoning, pneumonia, influenza and other infectious diseases, and, of course, hypothermia. The following summarizes in greater detail how these various effects of cold weather threaten older Americans.

HYPOTHERMIA

Hypothermia develops when body heat is lost to a cool or cold environment faster than it can be replaced. This heat loss causes the body temperature to fall below the normal 98.6°F, resulting in a life-threatening physical and mental deterioration. Without medical treatment and rewarming, the victim of hypothermia will die.

Although most people associate hypothermia with exposure to severe outdoor cold, indoor cold exposure is considered by experts to be the most common cause of hypothermia in the United States, and older Americans are its most frequent victims. Indoor temperatures do not have to fall below freezing to cause hypothermia in the elderly; most older victims become ill at temperatures between 50 and 65°, as a result of mild cold exposure which would only produce discomfort in younger people. The National Institute on Aging has estimated that over 2.5 million older Americans are especially at risk of developing hypothermia during the winter season.

Older individuals and others at risk may be exposed to cold outdoor temperatures when going to the store to get food, to visit friends, etc. The risk of an adverse health effect may be related to the temperature, wind speed, amount of snowfall or other participation and to the length of time that they are exposed. The availability of adequate transportation systems may be an important if not critical factor. Warning systems that alert individuals to the hazards of "cold weather" would also be important.

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INADEQUATE HEATING AND INSULATION: FIRES AND CARBON MONOXIDE POISONING

Many older individuals live in houses which may not have adequate heating or insulation. This is especially true among low-income individuals and in areas of the country such as the south in which cold fronts are less frequent.

Low fixed incomes, poverty, and the increased cost of fuel for heating and cooling the home create conditions in which many of the most vulnerable members of our communities are forced to make dangerous tradeoffs between energy and health. Energy conservation programs which encourage elderly people to reduce room temperatures below 70°F directly endanger the health and safety of those who are vulnerable to hypothermia. It is of critical importance that such suggestions for energy conservation be accompanied by safety information on cold stress and the importance of personal insulation. It is of little value to insulate the home without also providing information on how to insulate the person, particularly when economic conditions force the occupant to live in cool surroundings. The public health cost of hypothermia is very high, and experts estimate that tens of thousands of older Americans die in their own homes each winter as a result of exposure to cold.

Previous energy conservation programs have focused almost exclusively on structural insulation, and special conservation techniques for seniors with less physical stamina. The concept of personal insulation is vital to the safety of vulnerable older Americans who live in home environments cooler than 70°F.

A large number of older individuals live in houses built prior to 1940. Many have inadequate heating especially in rural areas. Second, the cost of heating an apartment or home may be substantial for older individuals having marginal incomes. For example, in Appendix II, Table 8, the average cost of heating by gas in the Northeast United States was $1035. However, one third of elderly individuals have household incomes less than $10,000. These individuals may try and minimize their fuel costs by keeping the temperature in the home or apartment as low as possible rather than a

minimum of 65°. In the worst case inability to pay for fuel energy could result in a termination of service and severe risk during a cold spell. The laws which regulate the termination of service and the effects on the health of the elderly have not been quantified.

A. Fires

There is a substantial increased risk of fire during winter months in homes and housing with poor, inadequate heating systems. Death rates due to fires are greatest in youth, children, and in the 65+ age group (Appendix II, Table 9). A recent report from the State of Georgia noted that approximately 83% of fire deaths occur in private dwellings (Appendix II, Table 10). In 1978, there were 1,696 deaths due to fires in the United States among persons aged 65+. This was 27.5% of all fire deaths. The death rates due to fires in homes has changed very little in recent years.

A study by Baker et al., in Baltimore, further noted that fire deaths are more likely to occur in the lowest income and rent areas of the city and that 20% of the deaths were directly related to faulty electrical and heating systems and that half occurred between 2 and 6 a.m. Fire deaths were nine times more frequent in low than high income areas, especially in the southern states. Furthermore, in 1977, there was a minimum of 360,000 days of hospital care for burned individuals over the age of 65 at an approximate cost of $131 million. It has been estimated that smoke detectors would prevent 90% of these deaths and severe burn injuries. At least some of the excess mortality related to cold weather is due to fire deaths.

B. Carbon Monoxide

A second problem is related to the use of unsafe heating equipment. This can obviously result in a risk of fire but also to increased levels of carbon monoxide and other pollutants. Carbon monoxide is produced by the incomplete combustion of any carbon-containing substance. The major source of carbon monoxide is from cigarette smoking. Other sources of carbon monoxide are in transportation, from auto exhaust, occupational exposure and from home heating.

Carbon monoxide is an odorless, tasteless gas. It interferes with the ability of the blood to carry oxygen to the tissues. High levels of carbon monoxide are usually fatal for most individuals. Relatively low levels that would be found in homes with defective heating systems, may have a very adverse effect on the health of individuals who have pre-existing heart or lung disease. Radford, et al., demonstrated in a national sample of the U.S. population that the mean carbon monoxide levels in blood (COHB) were higher in winter than summer months. The precise contribution of carbon monoxide exposures to increased heart attack deaths during cold spells needs to be determined. Individuals at particular high risk would be users of space heaters especially if unvented and old and defective central heating systems, poorly ventilated fireplaces and use of coal or woodburning stoves as extra sources of heat. Carbon monoxide monitors are now available that can be placed in individual homes to detect possible increased carbon monoxide levels. The cost of the monitors is low — $1.50-2.00 — and have been shown to save lives.

INFLUENZA AND PNEUMONIA

At least part of the excess mortality in cold weather is due to a higher frequency of influenza, pneumonia and other infectious diseases in the winter since 1970 (Appendix II, Table 11). The Center for Disease Control maintains an effective influenza and pneumonia surveillance system. The Public Health Service Advisory Committee on Immunization Practices, recommends vaccination for individuals over 65 years of age. An update of specific vaccine recommendations is published annually.

Unfortunately, the costs of influenza vaccine are not covered by the Medicare program. Pneumococcal vaccine is covered under Medicare. There appears to be only limited use of pneumococcal vaccine in the United States. Pneumonia and influenza continue to cause the death hospitalization and disability for many individuals. (Appendix II, Table 12)

AN ANALYSIS OF FEDERAL AND NON-FEDERAL EFFORTS TO REDUCE EXCESS MORTALITY ASSOCIATED WITH COLD WEATHER

The Subcommittee identified numerous government agencies that had an interest in the health effects of cold weather.

The National Center for Health Statistics publishes tabulations of the number of deaths and death rates by month of year for the United States and each State. The National Center is the major source of health statistics in the United States.

The Center for Disease Control has monitored deaths due to hypothermia. The Center publishes a weekly report of deaths in 121 U.S. cities. The Center also monitors influenza and pneumonia deaths. Recommendations for the use of influenza vaccine are published annually by the Center. The Center does not presently have a specific program to prevent the excess cold-related deaths. No federal program to increase the use of influenza vaccine for the elderly was found by the Subcommittee.

The Environmental Sciences Research Laboratory of the Environmental Protection Agency had a major interest in investigating cold- and heat-related deaths. They have previously documented excess mortality during "cold waves." Their activities are currently dormant.

The National Health, Lung, and Blood Institute of the National Institutes of Health, has studied the relationship between cold weather, snow, and excess heart attack and stroke deaths. Although they found an excess of heart attack deaths in winter, no further follow up studies are being done to investigate the reasons for the excess and their prevention.

The National Institute on Aging held a workshop on Accidental Hypothermia and the Elderly on December 11-12, 1979. Other than these activities, the NIA does not have a formal program related to the adverse effects of cold weather on the elderly.

The National Oceanic and Atmospheric Administration (NOAA) produces a Climate Impact Assessment Report that includes estimates of excess deaths due to cold as well as other weather-related events.

Recently, the Administration on Aging has taken an interest in cold weather and the elderly and supported a health education and information program about the risks, diagnosis, and treatment of hypothermia. On October 4, 1983, a national symposium was convened in Washington, D.C. by the Administration on Aging, the U.S. Office of Consumer Affairs, the American Gas Association, the American Association of Retired Persons, and the Center for Environmental Physiology to focus attention on hypothermia. The Administration on Aging is continuing to fund health education efforts.

Most non-federal action has been in the area of health education. The Center for Environmental Physiology has received financial support from the Administration on Aging to develop educational materials related to hypothermia. The Washington Area Project on Health and Cold Stress is the first of its kind in the country. It was begun in the winter of 1981 with seed money from the D.C. Office on Aging, Potomac Electric and Power Company and Washington Gas Company. This program is now being expanded into surrounding counties in Maryland.

There is also an International Hypothermia Association. The primary function of the Association is to coordinate research and educational activities related to hypothermia, especially as it is related to water submersion.

The National Association of Regulatory Utility Commissioners publishes a Survey of Natural Gas and Electric Utility Uncollectible Accounts and Service Disconnections for 1982 (see Appendix IV).

Although many federal agencies have a related interest, there is no coordinated Federal or non-Federal activity related to the adverse effects of cold weather. Given the large number of deaths in winter compared to summer, the potential for prevention in this area is apparent.

SUMMARY AND CONCLUSIONS

There is a substantial public health problem due to the cold weather. It is the greatest environmental health problem of the elderly and along with influenza and pneumonia represents the two major reasons for excess mortality from year to year, and within a single year, across the United States. There is little evidence that the excess mortality due to cold weather is decreasing in the United States. Rather, the Subcommittee found that deaths due to cold weather are increasing annually.

Unfortunately, although excess winter deaths have been noted for generations in the United States, there is little evidence of an organized, public health response.

The Subcommittee found that many of the problems due to cold weather are remedical and suggests that a vigorous and coordinated public health effort be developed to curb this increasing problem.

SUGGESTIONS FOR REFORM

It is apparent that a coordinated and comprehensive attack is necessary if there is to be any hope of limiting the increasing number of excess deaths in the United States due to cold weather. Obviously the problems associated with cold weather can never be eliminated altogether. However, because so little is being done at the present time at either the State or the Federal level, even a modest reform effort can have significant and far-reaching results. In short, the excess deaths in the winter and related to cold weather should not be accepted as an unsolvable problem. The excess 60,000 deaths are only a reflection of the increased hospitalization, disability and severe discomfort that occurs when individuals, especially senior citizens, are unprepared for the cold weather.

First, no specific government agency has a primary responsibility for monitoring the adverse effects of cold weather and implementing a treatment and prevention program. Recurrent cold waves will occur and continue to kill more people unless a coordinated effort to combat this problem is begun. The key steps needed should include:

(1) Better monitoring of cold-related morbidity is needed. The frequency of abnormally low body temperatures ("hypothermia") among the elderly should be determined, and the relationship of winter temperatures in their homes to type and adequacy of heating systems;

(2) The National Weather Service should develop an early warning system for "cold waves." This warning system will have to be specific for different areas of the country. Along with the warning system, health information messages should be provided about the potential dangers of cold weather and preventive actions that may be required;

(3) Local, State and Federal health organizers should develop an energy response program to possible "cold waves." This response system should be in place prior to the winter season.

The education of the public about "cold" should be a major component of this program;

(4) A major effort should be made in each community to ensure that all older individuals have adequate heating in their homes before the winter season and "cold waves." The frail elderly living alone in older houses and the elderly poor are at greatest risk. An agency within each community should have primary responsibility for identifying "at risk" houses and apartments. Adequate federal funds should be made available to provide proper insulation and adequate heating. The alternative will be increased risk of illness, costly hospitalization and institutionalization and possibly death. An emergency response system, well publicized in the community, should be available for situations in which adequate temperatures in the home cannot be maintained, and the residents have a high risk of hypothermia and other complications of cold temperatures.

Health organizations should work closely with Gas and Electric Companies to prevent gas and electric shutoffs to residential customers. Shutoffs during the wintertime should not be allowed without adequate warning and notification of a responsible health department. A list of current regulations is included in Appendix IV of this paper.

Inexpensive wall thermometers that could be kept in the bedroom or living room of an older individual may be an important preventive step especially if combined with a specific and simple message about what to do if the temperature goes below a certain level, i.e., less than 65° for several hours.

(5) Accidental carbon monoxide deaths in the home are preventable. The Consumer Products Safety Commission should monitor the production of carbon monoxide by space heaters

and other portable types of heating equipment. Inexpensive monitors are available to check for increased levels of carbon monoxide in the home. Health education programs describing the risks of carbon monoxide poisoning should be widely distributed. All deaths due to accidental carbon monoxide inhalation, especially in the home, should be reported and investigated, and the specific reason for the carbon monoxide exposure determined in order to prevent subsequent similar accidents.

(6) The excess in fire deaths, especially among the elderly, is a tragedy. Many of these deaths occur in older homes, rural areas, and among lower income groups. Safe heating systems, smoke detectors and adequate fire escapes should be mandatory in all multi-dwelling homes and hopefully in all houses in the community. Fire prevention and especially prevention of burns and deaths should be an important component of the national health education efforts. The Consumer Products Safety Commission and other government agencies should carefully monitor space and other portable heaters for potential fire hazards.

(7) The Center for Disease Control has recommended the use of influenza vaccine for individuals over the age of 65. In spite of this recommendation, there is no concerted effort to immunize the elderly population and excess mortality and morbidity due to influenza continues. The Medicare program does not cover the costs of influenza immunization. It is puzzling that the government agency most responsible for prevention, the Center for Disease Control, has recommended a specific important preventive action — and yet, no effective implementation of this recommendation has occurred in either the public or private sector.

Federal policy with regard to the influenza vaccine and implementation of public health programs should be coordinated.

(8) Most physicians are unaware of the potential hazards of "hypothermia" and methods of treatment especially for the elderly. More professional education about hypothermia including diagnosis and treatment should be provided. This probably should include an increased availability of low-reading thermometers.

APPENDIX I

"HYPOTHERMIA:
A PREVENTABLE TRAGEDY"

A Cold Weather Guide for the Elderly

PREFACE

John S. was a robust and active man. On a clear December morning, as every morning, he rose precisely at 7:00 a.m. Taking his walk he noticed others clothed in heavy coats and mufflers. He had only a light fall jacket on. His skin was taunt and shiny, with a strange pink glow. He felt fine. All those years of exercise were paying off.

That evening John was rushed to a local hospital, confused, his speech slurred, his breathing slow and shallow. Accidental hypothermia had struck another victim.

Mr. S. was lucky. His case was diagnosed correctly and his life was saved. Not all persons are that fortunate.

As the body ages it becomes less able to adjust to extremes in temperature. Experts agree that the menace of hypothermia is particularly great for the aged. Ill informed on the nature of this ailment many older Americans are affected without realizing their condition. Efforts must be made to make the elderly aware of those precautions to be taken in dealing with the threat. Otherwise this silent killer will continue to be responsible for thousands of deaths each year.

Mortality from accidental hypothermia reaches 50% in documented cases of elderly victims. Chances for recovery depend upon a number of factors, such as the patient's age, degree of internal chilling, as well as the patient's previous physical condition. However, early detection in addition to the duration of hypothermia and the method of treatment of particular importance upon the victim's ability to survive this illness.

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Studies have shown that the degree of internal chilling appears to be of greater significance than the relative age of the elderly victim. The lower body temperatures dramatically decrease survival chances. For example, one study showed a 75% mortality for elderly victims admitted to the hospital with temperatures below 86° Fahrenheit as compared with 39% whose temperatures were between 86° and 95° Fahrenheit. Early detection greatly improves the chances for eventual recovery.

Both body temperature and age appear to be less significant in determining recovery than the presence of an underlying disease. In those cases where hospital admission takes place, the most important condition for survival appears to be the general health of the victim. Consequently the frail, the debilitated, and the sick are at far greater risk.

It is, however, particularly important to remember that many otherwise healthy elderly victims die in their own homes without ever reaching the hospital. Hypothermia dulls the mental faculties to such a degree that the victim is never aware of the condition and is entirely dependent upon the awareness, knowledge and action of others. Unfortunately, accidental hypothermia is often overlooked and dismissed as simple disorientation, lack of coordination or confusion. Without recognition, the eldely victims lack even a chance of recovery, and death is inevitable.

Accidental hypothermia can worsen preexisting conditions such as heart disease and diabetes. Fall of the body's temperature below 90° Fahrenheit is dangerous because cold slows the normal body processes and important body functions are often disrupted. Complications increase as the temperature falls to lower levels, and heart, blood, liver, kidney pancreas and gastric problems may develop. Pneumonia is also a common complication for hypothermia victims.

Many of these problems are treatable by proper rewarming, but some require special attention, especially in older adults with pre-existing conditions. Hypothermia has been reported to cause permanent damage in some individuals, but further research is needed to determine the risk of permanent damage in otherwise healthy older adults.

The most serious complication of a low body temperature is a vulnerable heart. Cold slows and weakens the heart, and it is very important that the victim be handled gently.

The key to avoiding hypothermia is increased awareness. It is usually an accidental death. Indoor exposure is the most common form of the condition. Attempting to conserve energy, many elderly turn their thermostats down to an unsafe level. Unknowingly, they place their lives in jeopardy. The older populace must be better informed about this threat.

It is the purpose of this document to provide older Americans and service providers with practical information on accidental hypothermia. We believe it can make a difference this winter and in the years to come.

If one life is saved the Subcommittee will have accomplished its goal in publishing this booklet.

Claude Pepper, M.C.
Chairman

Ralph Regula, M.C.
Ranking Minority
Member

Subcommittee on Health and Long-Term Care

INTRODUCTION

With escalating fuel costs many of America's poor, and those on fixed incomes, are forced to conserve energy in order to buy food and clothing. Winter poses a life-threatening situation for these people. This plight is aggravated by the fact that most adults are unaware of the danger and unfamiliar with physical techniques for reducing or preventing cold stress.

The poor elderly are extremely vulnerable to this cold weather threat. It is essential the aged take advantage of all resources and programs to maintain an acceptable room temperature. If a home is heated at 50 to 65° Fahrenheit it may be lethal to its elderly inhabitants. "Safe" energy conservation must be exercised.

The National Institute on Aging estimates that more than 2.5 million older Americans are vulnerable to the hypothermia threat. Also at high risk are newborns and infants.

Information is the safeguard of the young, aged, and disabled against the silent killer. Emphasis has been placed upon energy conservation, fuel savings, and America's energy independence. Both financial and patriotic reasons have spurred on citizens to lower their thermostats. But little has been said of the inherent risks.

Potential hypothermia victims must be made aware of the danger. The focus of this booklet is to provide data so that an informed decision can be made in reducing the temperature in your home. It is also an information source for those persons providing supportive services to potential victims.

WHAT IS HYPOTHERMIA?

Hypothermia is an abnormally low body temperature caused by exposure to the cold. It is a state of rapid heat loss. Simply put, the rate of body heat production can no longer keep pace with the rate of heat loss. Typically, an inner body temperature of 95° Fahrenheit (35° Centigrade) or under is hypothermic. The normal body temperature is 98.6° Fahrenheit. A simple drop in skin temperature is not hypothermia. Rather it is a lowering of the inner body heat level.

Hypothermic conditions may affect all persons, yet, it is the elderly who are particularly susceptible. Conservative sources estimate that nearly 25,000 older citizens die each year from this condition. Particularly at risk are elderly persons with illnesses, or those using alcohol or certain types of prescription drugs (such as antidepressants, sedatives, and tranquilizers). Hunger and fatigue can also increase the risk of hypothermia.

It is important to remember that hypothermia is not limited to extremely cold weather outdoors. Temperatures do not have to be below freezing, or even near that level. Prolonged exposure to cool temperatures indoors may also lower the body temperature to an unsafe level. A simple drop in skin temperature is not hypothermia. Rather it is a lowering of the inner body heat level.

FACTORS INCREASING THE RISK OF HYPOTHERMIA

Older Americans are at a greater risk than most groups due to their tendency to develop a low body temperature. Coupled with the natural effects of aging the elderly are subjected to numerous other factors that affect the body's control over heat loss and production. Approximately 10% of all elderly have some form of temperature regulating disorder.

1. NUTRITION

Good nutrition is very important in maintaining a normal body temperature. Food is the fuel used by the body to generate heat. An inadequate diet will will make it more difficult for the body to maintain normal temperature.

An adequate diet refers to a nutritionally balanced diet. That is why it is important that the elderly maintain good eating habits which provide sufficient amounts of vitamins and minerals and an adequate intake of calories.

2. ILLNESS

Certain diseases or disorders can markedly increase the body's vulnerability to temperature change.

A. MENTAL ILLNESS

Frequently, persons who suffer from mental disorders are unaware of environmental changes. Exposure to a cold environment simply goes unobserved. The situation is further complicated by the presence of many therapeutic drugs which impair the body's regulation over heat production.

B. HYPOTHYROIDISM

Reduced thyroid function lowers metabolic rate and

consequently brings about a decrease in body heat production.

C. STROKE AND NERVOUS SYSTEM DISORDERS

Persons with strokes or nervous system disorders have an impaired temperature sense as well as a reduced capacity to respond with shivering and other heat conservation measures.

3. ALCOHOL

The risk of hypothermia is magnified by the use of alcohol. Alcohol dilates blood vessels, depresses the nervous system, and decreases blood sugar. Concealed by the dulling effect of this depressant a lethal drop in body temperature can go unnoticed.

It is important to note that alcohol decreases sensation in relationship to the quantity consumed. It follows that drunkenness is not a prerequisite for being unaware of a lowered body temperature. Whenever a person uses alcohol they should be cognizant that such consumption will affect their level of physical sensation to some degree.

4. DEFECTS IN SKIN BLOOD FLOW

Skin is the body's first line of defense against the cold. In response to cold, blood vessels near the skin should constrict and reduce the flow of warm blood near the surface. This makes the skin appear pale. Muscles tighten and cause shivering. A signal is given to add clothes or find a warmer environment. If a defect is present in this skin-blood flow relationship the victim may continue unaware of his declining body temperature.

5. PRIOR CASE-HISTORY OF HYPOTHERMIA

Persons who have experienced hypothermia often are unable to maintain a normal temperature if they are later subjected to even mildly cold temperatures.

6. MEDICATIONS

It has long been known that many drugs can precipitate both hypothermia and hyperthermia, or abnormally high temperature. The normal mechanisms that compensate for variations in temperature in our environment are generally less efficient in the elderly. For these susceptable individuals, the combined effects of cold weather and drugs can rapidly induce hypothermia, often with devastating results.

Some common drugs often prescribed for the elderly which can seriously impair the body's ability to adjust are: barbiturates, sedatives, tranquilizers, antihypertensives, vasodilators, and antidepressants.

Once again, the watchword for hypothermia is awareness. Any physical or mental disorder which inhibits an individual's senses increases the risk of hypothermia. If conscious of this fact, however, a person can take necessary precautions to decrease its effect.

SIGNS AND SYMPTOMS

One of the most drastic problems of accidental hypothermia is the non-specific signs of the illness. Usually, the first thought is that the person has had a stroke or other mental disorder. It is not obvious to the family, friends, physician, and least of all not to the patient, that the patient is hypothermic.

Most older adults develop accidential hypothermia over a period of three days to one week. Although the clinical picture is non-specific, there are warning signals, which should be heeded, that hypothermia may be eminent.

Outward Signs and Symptoms

- **Confusion** — Confusion or reduced alertness is one of the first apparent signs of hypothermia. These signs usually worsen in a rapid fashion as body temperature falls. Logical thinking becomes impossible and the person may become completely disoriented. Memory is affected and familiar things are often forgotten.

- **Coldness** — If the victim complains of cold it is usually during the early stages when the body temperature is between 95° Fahrenheit and 97° Fahrenheit. Once body temperature falls below 95° Fahrenheit, response to cold is diminished or eliminated.

- **Shivering and Trembling** — In the early stages, shivering gripes the hypothermic victim indicating the body is having trouble keeping warm. This will cease as the hypothermia becomes more severe. Trembling usually ensues on one side of the body or in one arm or leg.

- **Breathing Rhythm and Heart Rate** — Both become reduced and they may become difficult to detect when hypothermia is severe.

Sleepiness — If the victim's hypothermic condition is not discovered, this sleepiness may progress to coma over a one-half day to three day period. Coma may be accelerated by the presence of an additional complicating acute illness.

Skin — The skin becomes pale and dry due to inadequate constriction of the blood vessels. However, the skin may also have large, irregular blue or pink spots. The skin also feels cool or cold, even in covered areas such as the abdomen and back

Muscles — The muscles become unusually stiff, particularly in the neck, arms and legs.

Swelling — Swelling of the face is most common and becomes an important sign of hypothermia, especially when found in combination with cold skin and signs of confusion.

Coordination — The individual often has difficulty walking and has problems with balance.

Bruises — Bruises and blistered lesions may also be found and are most likely related to pressure.

Kidney Excretion — The cold forces the kidney to excrete large volumes of body fluid which could lead to dehydration.

Attitude — Apathy is comon in a hypothermia victim. The individual may also become irritable, hostile and aggressive.

Speaking — Difficulty in articulating will occur.

Unconsciousness

TREATMENT

The obvious goal of treatment for a victim of hypothermia is to rewarm the body. The usual method of raising the body temperature back to normal is Rapid Active Rewarming (RAR) which is accomplished by providing the victim with a warm bath. However, this means of treatment is usually used for young, previously healthy victims of exposure. RAR is strongly advised against in assisting an elderly hypothermic victim.

RAR in elderly victims often times produces a perplexing and lethal syndrome of worsening metabolic abnormalities such as a further fall in the body's core temperature and a profoundly low blood pressure reading.

For an elderly hypothermia victim, treatment should be administered by a physician who is familar with hypothermia in a hospital or clinical setting whenever possible.

A person suspected of having hypothermia should have his/her rectal temperature taken with a special, low reading thermometer, if possible. The 'normal' thermometer's lowest reading is between 94° and 95° Fahrenheit and, therefore, will not usually cause one to suspect hypothermia.

Slow Spontaneous Rewarming (SSR) should be administered by the medical staff. During SSR body heat is conserved with blankets and the core temperature is monitored. The core temperature is allowed to rise no more than 1° Fahrenheit per hour to avoid a worsening of metabolic abnormalities.

If emergency medical help is slow to arrive, further heat loss can be prevented by wrapping the victim in a warm blanket. Food and drink can pose dangers for a hypothermic person and should be avoided.

If blankets are not available the body heat of another person lying close to the victim will aid in rewarming. Care should be taken in handling a victim of hypothermia. Rubbing of limbs can worsen the condition and cause injury. Sudden

movement or rough handling can easily cause a fatal heart attack (ventricular fibrillation).

It is best that the victim not try to walk or move around because he or she might fall and suffer further injury. Care should be taken in moving and handling the victim since the heart muscle is very weak when the body is cold.

The victim should not be placed in a hot bath or shower because it could cause fatal rewarming shock or afterdrop in body temperature. Additionally, the victim should not be placed in an electric blanket and should not be given a hot water bottle. These actions would have the same effect on the victim as a hot bath or shower.

The victim's feet should not be raised if they are unconscious. This will cause the cold blood to flow from the legs into the body core and further depress the body temperature.

REMEMBER

The elderly hypothermia victim MUST:

be given slow spontaneous rewarming (SSR)
be given professional attention
be handled gently

The hypothermia victim must NOT:

be rapidly rewarmed
be given food or drink
be rubbed
be moved suddenly or handled roughly
be placed in a hot bath or shower
walk or move around
be given a hot water bottle
be placed in an electric blanket
have their feet raised if the victim is unconscious

Seniors can prevent hypothermia by following a few very basic rules.

TEMPERATURE IN THE HOME — You should have thermometer in your house especially in rooms where you sleep and relax. The temperature should not go below 65° degrees Fahrenheit for any prolonged period while you are in the room.

Homes are often colder at night, and it is very important to make sure that the bed is warm, because hypothermia can begin during sleep. Hot water bottles, extra blankets and quilts, heating pads, and electric blankets can all help to keep the body warm at night. Extra clothes, particularly a nightcap, long underwear and socks may be worn for additional protection, but special care must be taken to make sure clothes are absolutely dry.

Insulate your home properly. There are various methods to be used in insulation. Install storm windows or polyethelene sheeting; caulking and weatherstripping; close the closet doors and close off unused rooms; close windows, curtains and shades during the nights and unusually cold days;

install aluminum foil radiator reflectors, insulate water heaters, attics, and attic doors; and seal bypasses and openings in walls.

Not only will this assist in preventing hypothermia but in most homes it may reduce your heating bills by as mush as 20 to 30 percent. This may also make you eligible for an Energy Tax Credit on your Federal Income Tax — check with your local Internal Revenue Service (IRS). Additionally, contact your local state energy office or local community service agency for information on special financial assistance.

CLOTHING — Clothing should be worn in several layers. Avoid tight clothing--loose cloths will trap much more warm air around your body. Heavy clothing is not as heat efficient as many layers of thin cloths. A Windproof outerlayer should be worn when you are outdoors.

Wool and most synthetics will keep you warmer than cotton because they absorb moisture and allow it to evaporate. Cotton holds moisture against the skin which may exacerbate the on-coming hypothermia.

Dark colors absorb heat and will, therefore, keep you warmer.

Tight shoes cut down the warm blood supply to the feet and are, therefore, a major cause of frostbite. It would be much better to have one less pair of socks and the shoes a little loose, rather than three pair of sox, tight shoes and reduced circulation.

If you are wasting heat, the body will try to conserve on its own by reducing the flow of warm blood to the skin, hands and feet. Wearing a hat will cause your body to send more warm blood to the hands and feet. A warm scarf to cover your neck should be worn.

Mittens are warmer than gloves because they allow fingers to warm one another.

Some publications have recommended that plastic bags be worn over clothes for additional insulation during home heating emergencies. This is bad advice because clothing will become damp from body moisture.

DAILY CHECK-IN — If you live alone, arrange for a daily check-in call with a friend, neighbor, relative, etc. Although this may seem unnecessary remember, most individuals do not realize hypothermia is emniment because they do not realize they are cold. Therefore, it is a good idea to make sure someone will be there each day to ensure their health.

GOOD NUTRITION — It is important to remember that good nutrition is vital to the prevention of hypothermia. Liquids are very important for energy and adequate blood volume for circulation. Although liquids should not be given to the victim of hypothermia, liquids are important in the prevention of hypothermia.

Smoking or coffee may cause a reduction in the flow of warm blood to the hands and feet. Moderation must be exercised.

DRUGS — Drugs are thought to be a major predisposing factor to hypothermia in older adults. Many drugs can directly impair the body's ability to regulate temperature, and many also increase the rate of heat loss. Your physician should be consulted and questioned as to whether or not any medication you are taking will have these effects. Make sure the medication is taken properly.

EXERCISE — During the waking hours, exercise will produce more body heat, and therefore, you will be warmer if you are more active during the day. More insulation is needed if you are stationary.

AVOID FATIGUE — Your body needs energy to fight the cold and fatigue makes you more vulnerable to submormal heat and cold.

AVOID EXCESSIVE DRINKING OF ALCOHOL — Contrary to popular belief, alcohol does not increase body heat. Alcohol greatly increases body heat loss by relaxing

skin blood vessels and allowing a greater supply of warm blood to flow near the cold surface. You feel warmer for a short period of time, but cool faster. Therefore, alcohol intake should be limited during the winter months of the year.

AVOID WETNESS — Moisture from perspiration, rain or melting snow can seriously reduce or destroy the insulating value of clothing because water conducts body heat over 25 times faster than air. The hair, body and clothing must be kept dry. Many individuals believe that snow at 15° Fahrenheit is more dangerous than rain at 40° Fahrenheit. This assumption is false. Snow at 15° Fahrenheit is dry and easy to work in if you are properly dressed more so than rain at 40° Fahrenheit which is very cold.

APPENDIX II, TABLE 1

Deaths:

A Comparison:

Last Two Weeks December 1982, First Week January 1982

Last Two Weeks December 1983, First Week January 1983

	1983 - Age 65+				1982 - Age 65+			
	Dec. 24	Dec. 31	Jan. 7	TOTAL	Dec. 24	Dec. 31	Jan. 6	TOTAL
NEW ENGLAND	480	476	504	1,460	465	363	498	1,326
MID-ATLANTIC	1,755	1,772	2,164	5,691	1,845	1,810	2,050	5,705
EAST NORTH CENTRAL	1,499	1,655	1,516	4,670	1,410	1,390	1,407	4,207
WEST NORTH CENTRAL	499	465	456	1,420	486	451	406	1,343
SOUTH ATLANTIC	898	739	744	2,381	702	744	709	2,155
EAST SOUTH CENTRAL	447	501	394	1,342	479	354	402	1,235
WEST SOUTH CENTRAL	841	801	599	2,241	741	633	531	1,905
TOTAL	6.419	6,409	6,377	19,205	6,128	5,745	6,003	17,876

1,127 EXCESS

(98)

APPENDIX II

Table 2
"Number of Deaths in the United States Due to Cold vs. Heat"

	Numbers of deaths in the United States		
Year	Excessive heat	Excessive cold	All Causes
1962	154	423	1,756,449
1963	196	457	1,813,199
1964	195	287	1,797,528
1965	106	298	1,827,776
1966	531	365	1,862,985
.....			
1973	182	383	1,972,827
1974	143	348	1,934,154
1975	194	360	1,892,674
1976	102	427	1,909,294
1977	315	635	1,899,476

APPENDIX II

Table 2A
"Deaths and Death Rates by Month:
United States, 1977 to 1978"

TABLE. DEATHS AND DEATH RATES, BY MONTH: UNITED STATES, 1977 AND 1978

[Rates on an annual basis per 1,000 population. Data are provisional unless otherwise specified]

Month	Number			Rate		
	1978	1977	1977 (final)	1978	1977	1977 (final)
Total	1,924,000	1,896,000	1,899,587	8.8	8.8	8.8
January	189,000	173,000	173,237	10.3	9.5	9.5
February	169,000	161,000	163,250	10.1	9.7	9.3
March	170,000	166,000	168,271	9.2	9.0	9.1
April	161,000	157,000	156,722	9.0	8.8	8.8
May	158,000	156,000	157,732	8.8	8.5	8.8
June	153,000	150,000	148,936	8.5	8.5	8.4
July	153,000	159,000	157,827	8.3	8.8	8.8
August	150,000	149,000	150,456	8.1	8.1	8.2
September	150,000	147,000	148,901	8.3	8.3	8.2
October	157,000	159,000	160,262	8.4	8.6	8.7
November	154,000	153,000	154,891	8.5	8.6	8.7
December	162,000	168,000	174,122	8.7	9.1	9.4

APPENDIX II

Table 3
"Death Rates by Month:
United States: 1964 to 1978"

Table B. DEATH RATES BY MONTH: UNITED STATES, 1964-78

(For 1978, based on provisional figures; for all other years, based on final data. Rates on an annual basis per 1,000 population)

Month	1978	1977	1976	1975	1974	1973	1972[1]	1971	1970	1969	1968	1967	1966	1965	1964
Annual	8.8	8.8	8.9	8.9	9.2	9.4	9.4	9.3	9.5	9.5	9.7	9.4	9.5	9.4	9.4
January	10.3	9.8	9.3	10.1	9.6	10.8	11.0	10.0	10.8	10.8	11.0	9.8	10.1	10.1	10.1
February	10.1	9.3	10.2	9.9	9.6	10.2	10.3	10.0	10.4	9.8	10.0	9.8	10.1	10.4	9.9
March	9.3	9.1	9.8	9.1	9.6	9.3	9.3	9.5	9.5	9.5	9.5	9.5	9.5	10.1	9.7
April	9.0	8.8	9.0	8.8	9.5	9.3	9.2	9.5	9.3	9.4	9.2	9.3	9.9	9.9	9.5
May	8.6	8.6	8.8	8.8	8.9	9.2	9.1	9.2	9.1	9.3	9.1	9.3	9.4	9.2	9.2
June	8.5	8.4	8.4	8.5	8.8	9.1	8.9	9.3	8.9	9.2	8.7	9.1	9.3	9.1	8.9
July	8.3	8.6	8.3	8.3	8.8	8.8	8.9	8.9	8.9	9.1	8.9	9.1	8.9	8.9	8.9
August	8.1	8.2	8.1	8.4	8.5	8.9	8.9	8.8	8.8	8.9	8.9	8.7	8.7	8.7	8.6
September	8.3	8.2	8.2	8.4	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.9	8.8	8.8	8.7
October	8.4	8.7	8.8	8.8	9.0	9.1	9.2	9.1	9.2	9.2	9.1	9.2	9.3	9.3	9.3
November	8.8	8.7	8.9	8.8	9.0	9.4	9.4	9.4	9.8	9.6	9.7	9.8	9.3	8.8	9.4
December	8.7	9.4	9.2	9.1	9.6	9.7	10.0	9.9	9.7	10.0	11.3	10.2	9.8	9.9	9.9

[1] Based on a 10-percent sample of deaths.

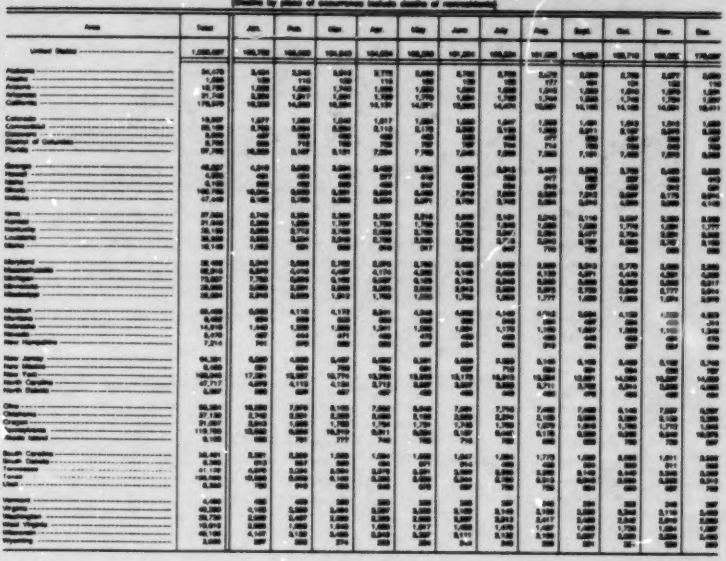
APPENDIX II

Table 4
"Deaths by Month and State of Occurrence: United States and Each State: 1978"

SECTION I – GENERAL MORTALITY

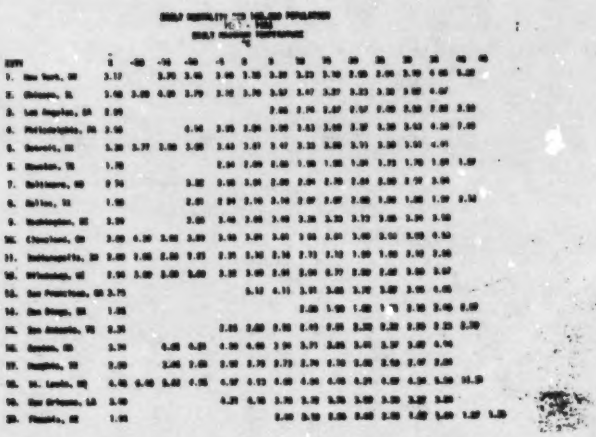
Table 1-20. Deaths by Month and State of Occurrence: United States and Each State, 1978

(Deaths by place of occurrence; includes deaths of nonresidents)



APPENDIX II

Table 5
"Death Rates in 20 Cities in Relation to Temperature, 1962-1966"



APPENDIX II

Table 6
"Daily Total Mortality in Relation to Temperature for Selected States in the U.S. for the period of January 25 - February 3"

State	1962-1965 N=40 Mean	95%	1966 - Cold Wave N=10 Mean	E.C.	Excess	Min. T(C)
ME	34	43	31	0	0	-24.4
VT	14	21	13	0	0	-28.9
NH	22	29	19	0	0	-28.3
MA	175	218	185	0	0	-16.1
RI	28	38	27	0	0	-16.7
CT	76	95	84	0	6	-15.6
NY	537	599	551	1	28	-13.9
NJ	191	226	194	2	7	-14.4
PA	366	400	382	6	22	-23.3
DE	13	21	15	1	7	-15.0
MD	92	124	97	4	0	-13.9
DC	26	36	30	1	1	-12.8
VA	109	135	119	10	0	-16.1
WV	54	66	56	3	9	-22.8
NC	119	142	136	10	22	-16.1
SC	66	80	74	4	18	-21.1
GA	112	139	137	6	52	-20.0
FL	159	183	194	1	156	-11.7
AL	95	117	108	5	43	-23.9
MS	69	85	84	3	63	-14.4
LA	89	105	104	1	37	-10.6
TX	245	300	271	4	69	-21.1
OH	278	317	291	4	14	-23.3
KY	92	106	97	1	19	-24.4
TN	104	126	107	8	3	-23.3
MI	201	242	214	1	0	-24.4
IN	135	158	135	1	1	-23.9
IL	317	345	329	4	63	-28.9
MO	151	174	157	2	3	-25.0
AR	58	70	61	3	13	-16.7
OK	72	87	78	0	4	-17.2
MN	93	110	93	1	2	-35.0
WI	111	137	112	3	0	-31.7
IA	84	100	85	1	0	-32.2
ND	15	24	16	2	0	-40.0
SD	18	28	15	1	0	-34.4
NB	42	50	42	1	8	-27.8
KS	66	82	65	0	0	-23.9
	4,528		4,807	97	670	

APPENDIX II

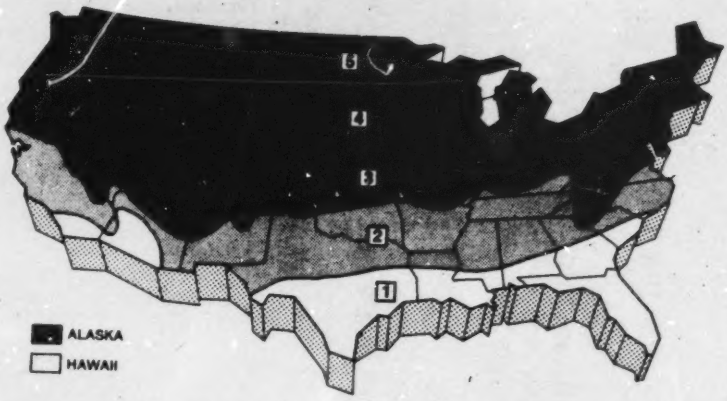
Table 7
"Daily Total Mortality in Relation to Temperature for Selected States in the United States, for the Period January 6 to 15"

State	1974-1977 N=40 Mean	95%	1973 - Cold Wave N=10 Mean	E.C.	Excess	Min. T(C)
ME	29	40	31	0	0	-24.4
VT	12	17	13	0	4	-27.2
NH	22	30	21	0	0	-27.8
MA	164	191	191	1	33	-17.2
RI	27	35	32	0	16	-15.6
CT	76	89	85	1	18	-17.2
NY	501	551	571	2	230	-11.7
NJ	193	213	225	1	138	-11.1
PA	360	405	400	4	102	-11.1
DE	14	20	16	0	2	-10.6
MD /	96	113	103	0	18	-11.1
DC	22	32	26	0	0	-15.0
VA	117	140	127	0	5	-15.0
WV	57	70	63	1	6	-15.0
NC	139	159	154	7	27	-15.0
SC	74	90	79	3	0	- 7.8
GA	128	149	140	3	18	- 8.9
FL	261	303	264	2	0	- 1.7
AL	105	128	109	0	6	-10.0
MS	69	85	79	0	3	-10.6
LA	100	116	119	1	53	- 6.1
TX	306	346	337	3	58	-10.0
OH	283	311	300	0	64	-12.8
KY	103	125	101	1	1	-11.7
TN	117	142	116	2	0	-13.3
MI	219	239	236	2	32	-13.9
IN	144	169	152	1	2	-15.6
IL	318	354	357	1	100	-17.2
MO	154	178	164	3	1	-17.2
AR	68	81	68	0	0	- 9.4
OK	87	100	85	3	0	-18.3
MN	99	129	97	2	0	-28.9
WI	118	142	125	3	3	-20.0
IA	89	116	85	1	0	-23.3
ND	16	25	15	0	0	-35.0
SD	19	30	19	3	0	-28.3
NB	44	56	47	0	0	-25.0
KS	70	84	73	1	10	-21.7
	4,820		8,225	82	950	

APPENDIX II

Table 8
"Average Annual Home Heating Costs:
1983"

Average annual home heating costs



*Based on a 1,000 square foot home with average insulation and weatherization, 1983 fuel prices. Local climate and fuel price difference will cause costs to vary.

FUEL:	ZONE: 1	2	3	4	5
OIL	$210	$520	$730	$875	$1040
GAS	265	665	775	1035	1375
ELECTRICITY	465	1150	1610	1950	2290
COAL	190	340	480	585	690
WOOD	150	345	510	620	730

SOURCE University of Connecticut

InfoGraphics 1983

APPENDIX II

Table 9
"Average Annual Death Rates for Burn Victims,
by Age, Sex, and Race —
Georgia, 1980-1981"

TABLE 2. Average annual death rates for burn victims, by age, sex, and race — Georgia, 1980-1981

Age (Years)	Deaths/100,000 population			
	White		Black	
	M	F	M	F
< 1	0.0	0.0	3.2	19.3
1-4	5.5	4.4	16.1	16.4
5-9	1.6	0.7	6.8	7.7
10-19	1.2	0.9	1.3	1.3
20-29	4.0	0.7	4.5	1.3
30-44	2.4	1.2	10.9	3.3
45-64	7.2	2.5	22.0	7.7
65-74	11.5	3.1	47.5	19.4
≥ 75	16.2	8.2	82.9	29.1

APPENDIX II

Table 10
"Distribution of burn-associated deaths
and death rates, by cause category —
Georgia, 1979-1981"

TABLE 1. Distribution of burn-associated deaths and death rates, by cause category — Georgia, 1979-1981

ICD* code	ICD cause classification	Number of deaths	Percentage of deaths	Death rate†
E-890	Conflagration in private dwelling	604	82.6	3.89
E 891-2	Other conflagration	20	2.7	0.12
E 893	Accident caused by ignition of clothing	36	4.8	0.21
E 894-9	Other and unspecified fire	53	7.3	0.32
E 924	Accident caused by hot substance or object, caustic or corrosive material, and steam	19	2.6	0.12
All above causes		731	100.0	4.46

*International Classification of Diseases, 9th Revision.
†Number deaths/100,000 population/year.

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APPENDIX II

Table 11
"Trends of Crude Mortality Rates from
Influenza and Pneumonia, Summer and Winter, by Sex-Color,
U.S., 1968-78, Rate per 4-Month Period"

Trends of Crude Mortality Rates from Influenza and Pneumonia (ICD 470-474, 480-486), Summer and Winter by Sex-Color, United States, 1968-78, Rate per 4-Month Period

Year	White Men		White Women		Nonwhite Men		Nonwhite Women		All	
	June-Sept.	Dec.-March	June-Sept.	Dec.-March	June-Sept.	Dec.-March	June-Sept.	Dec.-March	June-Sept.	Dec.-March
1968	9.0	20.1	6.6	17.1	12.6	30.8	8.5	21.4	8.2	19.4
1969	8.7	17.6	6.6	14.3	11.7	26.2	7.5	17.2	7.8	16.5
1970	8.7	15.6	6.4	12.0	12.0	23.2	6.8	14.7	7.8	14.4
1971	7.9	12.4	6.1	10.3	10.3	17.6	6.2	10.8	7.2	11.6
1972	8.0	16.1	6.2	13.2	10.3	20.6	5.5	12.8	7.2	14.9
1973	8.4	14.9	6.4	12.9	9.9	18.5	6.0	11.7	7.6	13.9
1974	7.6	11.7	6.0	10.2	9.2	13.1	5.0	8.1	6.8	10.8
1975	7.4	13.6	5.6	11.9	8.5	14.0	4.3	9.0	6.5	12.5
1976	7.0	15.1	5.4	14.8	7.9	14.9	4.2	9.6	6.1	14.6
1977	7.2	10.4	5.8	9.3	7.8	12.0	4.4	7.0	6.4	9.8
1978	7.2	13.2	5.7	12.9	7.6	13.6	4.2	8.2	6.4	12.7
Change 1968-78	-1.8	-6.9	-0.9	-4.2	-5.2	-17.2	-4.3	-13.2	-1.8	-6.7
Percent Change	-20.0	-34.3	-13.6	-24.6	-40.6	-55.8	-50.6	-61.7	-22.0	-34.5
Slope 1968-73	-0.0198	-0.0570	-0.0111	-0.0509	-0.0320	-0.1013	-0.0790	-0.1204	-0.0200	-0.0625
Standard Error	0.0095	0.0327	0.0065	0.0358	0.0094	0.0265	0.0158	0.0337	0.0092	0.0338
Slope 1973-78	-0.0390	-0.0464	-0.0302	-0.0382	-0.0629	-0.0737	-0.0795	-0.0857	-0.0452	-0.0598
Standard Error	0.0121	0.0524	0.0162	0.0655	0.0073	0.0418	0.0288	0.0495	0.0156	0.0568

APPENDIX II

Table 12
"Pneumonia and Influenza Deaths in the United States by Age, 1980"

AGE	
TOTAL	54,619
65+	30,212
65-74	8,668
75-84	17,003
85+	19,841
ALL DEATHS	
65+	1,341,848
% INFLUENZA AND PNEUMONIA DEATHS	2.2%

APPENDIX III

"Average Temperature on Day of Death
for 32 Selected Cities:
1962-1966"

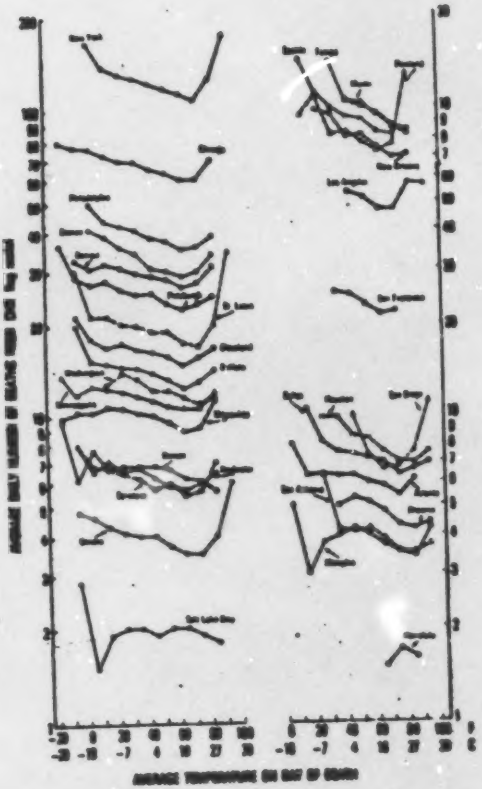

FIGURE 1. Average daily deaths from CHD by average temperature on day of death for 32 selected SMSA's: US, 1962-1966.

APPENDIX IV - page 1

SERVICE DISCONNECTION AND RECONNECTION POLICIES

Agency	Authority Which Governs Service Disconnections	Prior Notice (Days)	Special Notice Procedures	Authority Governing Service Reconnections	Additional Deposit for Reconnection
Alabama PSC	PSC, Utility Tariff Rules.	Varies (8-10)	Third party notification.	PSC	Varies with utility, up to 2 months bill.
Alaska PUC	Utility tariff.	Varies among utilities. See written notice.	Varies, third party notification, additional notice.	Utility tariff.	May be required equal to 2 months billing.
Arizona CC	CC	5	Third party notification.	CC	Two times average monthly bill if required.
Arkansas PSC	PSC	5	Third party notifications.	PSC	May be required; shall not exceed the estimated bill for 2 periods after service is rendered; shall not exceed the estimated bill for one period before service is rendered; shall not exceed the estimated bill for six periods plus potential damage to equipment if reason for the deposit is unauthorized or fraudulent use.
California PUC	Statute, PUC, Utility Tariff Rules.	15	Third party notification, additional notice.	PUC, utility tariff.	Varies
Colorado PUC	PSC	10	Third party notification; Notice in English and Spanish.	PSC	Estimated 60 day bill payable in 2 monthly installments.
Connecticut DPUC	PUC, statute	15	Third party notification.	PUC	no
Delaware PSC	PSC	Tariff regulations require 5; Delmarva provides 15.	During winter second notice must be mailed and 2 attempted telephone calls one after 6:00 p.m.	PSC	After service has been disconnected 2 times for nonpayment within the past 12 months, deposit is 2/12 of estimated annual revenue.
District of Columbia PSC	PSC	15	Third party notification; 2 attempts to contact the customer; notices in writing sent 1st class	PSC	Amount equal to actual or estimated cost of gas for a 60-day period of maximum usage or $100 whichever is less.
Florida PSC	PSC	5	Third party notification.	PSC	Shall not exceed an amount equal to twice the average charge for service for the 12 months prior to disconnection, or average usage.
Georgia PSC	PSC	5	Utilities have special notice procedures.	PSC, utility policies.	$15.00 - Gas. Not to exceed 2 1/3 times the bill - electric.
Hawaii PUC	PUC, utility tariffs.	7	Must report to PUC 5 days before terminating certain elderly and handicapped customers.	PUC and utility tariffs.	Not less than $10.00 and not more than the maximum estimated charge for 2 consecutive months of service

Payment By Installment of Outstanding Balance	Reconnection Charge	Restrictions on Service Disconnections in Winter	Date Instituted	Authority
Yes	Varies ($3.00-$15.00)	Varies with utility-restrict during periods of extreme weather.	1900-1981	PSC
Yes	Approximately $17.00 during business hours and $50.00 during non-business hours.	No		
Yes	$40 - Varies.	Weather may be deemed dangerous to health.	2/7/83	Statute
Yes	May be required, depends on reason for termination.	Termination may be delayed for elderly and handicapped persons or based on governmental guarantee of payment. Service shall not be terminated November through March if minimum temperature predicted is 32° or below. No terminations April through October if maximum temperature predicted is 95° or above.	4/21/81	PSC
Yes	Varies ($2.50-$5.00)	No		
Yes	$15	During any period when termination would be detrimental to health as certified by a licensed physician and inability to pay has been established.	4/21/80	PSC
Yes	Varies	No disconnections for hardship cases from Nov. 1 to April 15.	10/7/80	Statute
Yes	$15 during working hours; additional $10 after normal working hours.	Yes	10/10/75	PSC
Yes	Varies ($10-$15)	Service may not be terminated when temperature is forecasted to be 32° or below during the next 24 hours.	5/79	PSC
Yes	Up to utility.	No		
Yes	Varies ($5-$75)	Electric - No disconnections between November 15 and March 15 if customer agrees to pay past due by Oct. 15, agrees to pay all bills by due date and temperature for 24 hour period is forecasted below 32°. Gas - No disconnection when temperature forecasted below 32° during next 24 hour period.	Electric-1/1/80 Gas-11/21/79	Electric-PSC Gas-Statute
Yes	Varies ($5-$16)	No		

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SERVICE DISCONNECTION AND RECONNECTION POLICIES

Agency	Authority Which Governs Service Disconnections	Prior Notice (Days)	Special Notice Procedures	Authority Governing Service Reconnections	Additional Deposit For Reconnections
Idaho PUC	PUC	7	Third party notification. Personal contact in winter.	PUC	Maximum of one-sixth the amount of reasonably estimated billing for one year at current rates; customer may provide letter of guarantee in lieu of deposit.
Illinois CC	CC	8 if mailed.	Third party notification. Personal contact in winter.	CC	No
Indiana PUC	PUC	10	Third party notice.	PUC	Electric--shall not exceed one-sixth of estimated annual billing. Gas--not to exceed one third of estimated annual billing.
Iowa SCC	CC	10	Third party notification, attempt to contact by telephone or in person.	CC	No
Kentucky PSC	PSC	10	No	PSC	No
Louisiana PSC	PSC	5	No	PSC	May be required and should not cover more than 3 1/2 months of service.
Maine PUC	PUC	14	10 days notice to tenants.	PUC	No
Maryland PSC	PSC	14	Third party notification.	PSC	No
Massachusetts DPU	DPU, Statute	Annual notice--27, Final notice--1	Third party notice for elderly customers and DPU approval in winter.	DPU, Statute	No
Michigan PSC	PSC	10	Third party notice.	PSC	Not to exceed $150.
Minnesota PUC	PUC	10 if mailed 7 if personally delivered.	Welfare agency notified if service terminated October 15 to April 1.	PUC	Not to exceed 2 months bill.
Mississippi PSC	PSC	5	Up to individual utility.	Utility tariff	No
Missouri PSC	PSC	8	Third party notice; notice must contain specific information.	PSC	Not to exceed 3 times highest bill of the last 12 months.
Montana PSC	PSC	30	Third party notice.	No rules.	No
Nevada PSC	PSC	10	Yes	PSC	No
New Hampshire PUC	PSC	14	Must contact adult occupant or leave sealed note with instructions on reconnection.	PSC	3 times second highest bill if required.
New Jersey BPU	BPU	7-Electric 10-Gas	Third party notice.	BPU, utility tariff.	Gas-No; Electric-Yes, sufficient to secure payment of future bills.
New Mexico PSC	PSC	15	Third party notice, personal contact.	PSC	Up to 1 1/2# maximum monthly bill.
New York State PSC	PSC, Statute, utility tariff.	15	Third party notice; cold weather rules; medical emergency, elderly or disabled, tenants receive special notice.	Statute, PSC, tariffs.	No

ayment By Installment of Outstand ing Balance	Reconnection Charge	Restrictions on Service Disconnections in Winter	Date Instituted	Authority
Yes	Varies ($8-$30+)	No termination during months of December, January and February unless the utility can certify that there are no minors, elderly or infirm in household.	11/1/78	PSC
Yes	No	No disconnections when the forecasted temperature for the following 24 hours will be 32°.	1/6/79	PSC
lectric Yes	Varies	Customers eligible for State Assistance may not be disconnected December 1 through March 15.	9/1/83	Statute
Yes	Varies	No disconnection from November 1 to April 1 if customer qualifies for winter energy assistance funds.	1/1/83	CC
Yes	Varies	No disconnection November through March if customer presents certificate of need, pays 1/3 of bill and agrees to a repayment schedule.	1983	PSC
On a case-by case basis.	Varies	No terminations when it would be especially dangerous to health and customer is unable to pay for service or is able to pay only in installments.	11/3/80	PSC
Yes	Varies	December 1 through April 15 Agency approval required to disconnect.	11/1/83	PSC, Statute
Yes	Varies	Between November 1 through March 31, utility must provide an off-devil to PSC that termination will not endanger health.	10/13/83	PSC
Yes	Varies ($5-$15)	November 15-March 15, DPU approval required for heat related accounts. If customer below 150% of poverty level will not be shut off.	9/81	Statute
Yes	Varies ($5-$50)	Winter protection plan for qualified customers December 1 through March 31.	11/80	PSC
Yes	Varies ($5-$30)	October 15 to April 15.	1980	Statute
Yes	Varies	On yearly basis additional restrictions imposed.		
Varies	Varies	Disconnect only those customers who do not make a good faith attempt to pay between November 15 and March 31.	11/1/77	PSC
Yes	Varies ($10-$30)	No termination between November 1 and April 1 without PSC approval).	7/1/80	Statute
Yes	Varies ($5-$15.50)	No		
Depends on utility.	Varies ($10-$30)	No disconnection for arrears less than $175 for non-heating or $300 for heating customers.	1980	PSC
Yes	Electric-No Gas-Varies	No disconnection December through March 15 if customer receives welfare or other public assistance.	11/15/82	DPU
Yes	Varies	No		
Yes	Varies ($5-$40)	November 1 through April 15 special notice is required. Disconnection prohibited if it would cause serious impairment to health or safety or if because of physical or mental handicap customer is unable to manage resources.	10/19/81	Statute

APPENDIX IV - page 2

SERVICE DISCONNECTION AND DEPOSIT FOR RESIDENCE

Agency	Authority Which Governs Service Disconnections	Prior Notice (Days)	Special Notice Procedures	Authority Governing Service Reconnections	Additional Deposit For Reconnection
Idaho PUC	PUC	7	Third party notification. Personal contact in winter.	PUC	Minimum of one-sixth the amount of reasonably estimated billing for one year at current rates; customer may provide letter of guarantee in lieu of deposit.
Illinois CC	CC	8 if mailed.	Third party notification. Personal contact in winter.	CC	No
Indiana PSC	PSC	10	Third party notice.	PSC	Electric-shall not exceed one-sixth of estimated annual billing. Gas-not to exceed one third of estimated annual billing.
Iowa SCC	CC	13	Third party notification, attempt to contact by telephone or in person.	CC	No
Kentucky PSC	PSC	10	No	PSC	No
Louisiana PSC	PSC	5	No	PSC	May be required and should not cover more than 3 1/2 months of service.
Maine PUC	PUC	14	14 days notice to tenants.	PUC	No
Maryland PSC	PSC	14	Third party notification.	PSC	No
Massachusetts DPU	DPU, Statute	Added notice-21, Final notice-1	Third party notice for elderly customers and DPU approval in winter.	DPU, Statute	No
Michigan PSC	PSC	10	Third party notice.	PSC	Not to exceed $150.
Minnesota PUC	PUC	10 if mailed 7 if personally delivered.	Welfare agency notified if service terminated October 15 to April 1.	PUC	Not to exceed 2 months bill.
Mississippi PSC	PSC	5	Up to individual utility.	Utility tariff	No
Missouri PSC	PSC	6	Third party notice; notice must contain specific information.	PSC	Not to exceed 2 times highest bill of the last 12 months.
Montana PSC	PSC	20	Third party notice.	No rules.	No
Nebraska PSC	PSC	10	Yes	PSC	No
New Hampshire PUC	PUC	14	Must contact adult occupant or leave sealed note with instructions on reconnection.	PUC	2 times second highest bill if required.
New Jersey BPU	BPU	7-Electric 10-Gas	Third party notice.	BPU, utility tariff.	Gas-No; Electric-Yes, sufficient to secure payment of future bills.
New Mexico PSC	PSC	15	Third party notice, personal contact.	PSC	Up to 1 1/3% maximum monthly bill.
New York State PSC	PSC, Statute, utility tariff.	15	Third party notice; cold weather rules; medical emergency, elderly or disabled, tenants receive speci'l notice.	Statute, PSC, tariffs.	No

Payment By Installment Of Outstand ing Balance	Reconnection Charge	Restrictions on Service Disconnections in Winter	Date Legislated	Authority
Yes	Varies ($8-$100)	No termination during months of December, January and February unless the utility can certify that there are no minors, elderly or infirm in household.	11/1/78	PSC
Yes	No	No disconnection when the forecasted temperature for the following 24 hours will be 32°.	1/6/78	PSC
Electric Yes	Varies	Customers eligible for State Assistance may not be disconnected December 1 through March 15.	8/1/83	Statute
Yes	Varies	No disconnection from November 1 to April 1 if customer qualifies for winter energy assistance funds.	1/6/83	CC
Yes	Varies	No disconnection November through March if customer presents certificate of need, pays 1/3 of bill and agrees to a repayment schedule.	1981	PSC
On a case-by case basis.	Varies	No terminations when it would be especially dangerous to health and customer is unable to pay for service or is able to pay only in installments.	11/3/80	PSC
Yes	Varies	December 1 through April 15 Agency approval required to disconnect.	11/1/83	PSC, Statute
Yes	Varies	Between November 1 through March 31, utility must provide an affadavit to PSC that termination will not endanger health.	11/1/83	PSC
Yes	Varies ($5-$15)	November 15-March 15, BPU approval required for heat related accounts. If customer below 150% of poverty level will not be shut off.	8/81	Statute
Yes	Varies ($5-$60)	Winter protection plan for qualified customers December 1 through March 31.	11/80	PSC
Yes	Varies ($5-$20)	October 15 to April 15.	1980	Statute
Yes	Varies	On yearly basis additional restrictions imposed.		
Varies	Varies	Disconnect only, PSC to customers who do not make a good faith attempt to pay between November 15 and March 31.	11/1/77	PSC
Yes	Varies ($10-$30)	No termination between November 1 and April 1 without PSC approval.	9/1/80	Statute
Yes	Varies ($5-$15.50)	No		
Depends on utility.	Varies ($10-$30)	No disconnect on for arrears less than $15, for non-heating or $300 for existing customers.	1980	PSC
Yes	Electric-No Gas-Varies	No disconnection from December through March 15 if customer receives welfare or other public assistance.	11/11/83	BPU
Yes	Varies	No		
Yes	Varies ($5-$60)	November 1 through April 15 special notice is required. Disconnection prohibited if it would cause serious impairment to health or safety or if because of physical or mental handicap customer is unable to manage resources.	10/19/81	Statute

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